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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/761,641	01/18/2001	Shunpei Yamazaki	740756-002249	6097

22204 7590 10/10/2002

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EXAMINER

BOOTH, RICHARD A

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 10/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/761,641

Applicant(s)

YAMAZAKI ET AL.

Examiner

Richard A. Booth

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5,7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, U.S. Patent 5,904,509.

Zhang shows the invention substantially as claimed including ion-doping an impurity element of, for example, phosphorous at a concentration of  $1 \times 10^{17}$  to  $2 \times 10^{18}$  atoms/cm<sup>3</sup> into a semiconductor film 303 by a plasma doping process which requires no mass separation, and wherein a concentration of oxygen, carbon, and nitrogen is less than  $1 \times 10^{17}$  atoms/cm<sup>3</sup> in the film in order to facilitate crystallization (see Figs. 3A-3F, and col. 7-line 5 to col. 9-line 56 and col. 5-lines 30-35). With respect to the overlapping ranges, a prima facie case of obviousness is still established because overlapping ranges constitute a prima facie case of obviousness (see MPEP 2144.05).

Furthermore, it would have been obvious to have an opposite conductivity type dopant such as boron, if an opposite conductivity type transistor is desired. Additionally, official notice is taken that both phosphine and diborane are well known elements to impart n and p type conductivity to a silicon film, respectively.

Claims 9-10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, U.S. Patent 5,904,509 as applied to claims 1-8 and 11 above, and further in view of Miyasaka, U.S. Patent 6,455,360.

Zhang is applied as above but fails to expressly disclose wherein an impurity element imparting p-type conductivity is conducted with a gas of diborane diluted with hydrogen from 0.5% to either 1 or 5 percent so that the concentration of hydrogen is  $1 \times 10^{19}$  atoms/cm<sup>3</sup> or less.

Miyasaka discloses performing a doping step using diborane diluted with hydrogen at a concentration of 0.1 to 10% (see col. 22-lines 37-41). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Zhang so as to include a diborane gas diluted with hydrogen because Miyasaka shows this to be a suitable combination to form doped region in thin film structures.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is 308-3446. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 308-3325. The fax phone numbers for

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the organization where this application or proceeding is assigned are 308-7724 for regular communications and 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-1782.



Richard A. Booth  
Primary Examiner  
Art Unit 2812

October 7, 2002